Introduction to Digital Computers / Computer Structure - Spring 2003
Assignment No. 10

Firm Deadline: May 22nd - before the beginning of the lecture

1. Answer question 10.2 in chapter 10 of the lecture notes.
2. Consider the toy depicted in Figure 1. In each cycle, a marble is dropped in at A or B (but not both), Levers x, y, z cause the marble to fall either to the left or to the right. If a marble encounters a lever, then it causes the lever to change its state, so that the next marble to encounter the same lever will take the opposite branch.
   (a) Describe the FSM that models this toy and draw its state diagram (state explicitly the set of states, input/output alphabet, transition function, output function, and initial state).
   (b) Implement this FSM using flip-flops and gates.
   (c) Write all the timing constraints.
   (d) Compute the minimum clock period of this circuit.

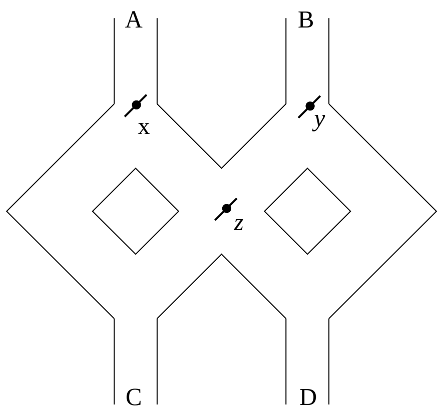

Figure 1: A toy.